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EXAMINER

LEADER, WILLIAM T

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Paper No. 24

Application Number: 09/223,472

Filing Date: December 30, 1998

Appellant(s): LEE, KEVIN J.

Stephen M. DeKlerk
For Appellant

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EXAMINER'S ANSWER

This is in response to the appeal brief filed January 6, 2002, with a certificate of mailing dated December 30, 2002.

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(1) *Real Party in Interest*

A statement identifying the real party in interest is contained in the brief.

(2) *Related Appeals and Interferences*

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) *Status of Claims*

In view of appellant's arguments, the rejection of claims 1-5 and 18-32 is withdrawn. Claims 25, 26 and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Otherwise, the statement of the status of the claims contained in the brief is correct.

(4) *Status of Amendments After Final*

No amendment after final has been filed.

(5) *Summary of Invention*

The summary of invention contained in the brief is correct.

(6) *Issues*

The appellant's statement of the issues in the brief is correct.

(7) *Grouping of Claims*

Appellant states that the claims 1-5 and 18-33, all of the claims in the application, stand or fall together.

(8) *Claims Appealed*

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) *Prior Art of Record*

4,151,062	Norris	4-1979
4,443,304	Eidschun	4-1984
5,443,707	Mori	8-1995

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim 33 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 33, line 3 refers to "the cross pattern". This expression lacks antecedent basis. It appears that claim 33 should be dependent on claim 32 rather than claim 27. Note that similar claim 26 depends on claim 25.

Claims 1, 3, 4, 5, 18, 19, 22, 23, 27, 29 and 30 stand rejected under 35 U.S.C. 102(b) as being anticipated by Norris (4,151,062).

Norris discloses a method and apparatus for electrolytically depositing metals onto a substrate which is connected as a cathode. The apparatus is illustrated in figures 2, 3 and 4. Figure 4 can be considered a front view, and figure 3 can be considered as a view from the right. The electroplating system includes recovery apparatus 10, which is an enclosed chamber with housing 24 (figure 2; column 3, lines 48-49). The apparatus may be used for recovering valuable metals from a liquid electroplating solution (column 1, lines 5-6). The metals are electroplated from the solution onto plate electrodes 108 and 110 which serve as the substrates.

The plate electrodes are positioned to face the interior of the chamber. One of the plate electrodes is connected as the cathode (column 5, lines 2-3). As shown in figure 4, electrolyte is introduced through a plurality of liquid outlets 128, 130, 132, 134, 136 and 138. In figure 4, the central axis of the plate electrode normal to the surface would be located at approximately the center of the figure and would extend into and out of the plane of the paper. Thus, the liquid outlets are off-center from the central axis of the substrate. Since the outlets do not point directly at the surface of electrode plate 108, they are at an angle which is other than normal to the surface. In figure 3, which is a view from the right, the nozzles are not visible because they are on the opposite side of vertical tube 82. If they were shown in phantom (or if the pipe were made of transparent plastic), outlets 128, 130 and 132 would be seen to point down as shown in figure 4. Norris teaches that the nozzles are arranged to move the solution in a circular pattern (column 2, lines 47-50). Thus, the flowing liquid would have a circumferential and radial component as recited in instant claims 23 and 30, and be directed radially outward as recited in instant claims 22 and 29. Column 6, lines 44-50 disclose a flash coating of copper as recited in instant claim 5.

Claims 1-5, 18-24, and 27-31 rejected under 35 U.S.C. 103(a) as being unpatentable over Mori (5,443,707) in view of Norris.

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Norris is taken as above. As previously pointed out, Mori is directed to a process of electroplating a metal onto a substrate. The substrate may be located to form a seal as recited in instant claim 2. See, for example, figures 3 and 6. As shown by the arrows in figure 3, the electrolyte is injected in a plurality of directions, one of which is perpendicular to the substrate as recited in instant claims 24 and 31. Note the direction of the flow shown in figure 6. Norris additionally discloses that it is well-known that electroplating processes can be better carried out at high speeds in agitated plating baths than in non-agitated baths. The reason for such faster rate of deposition is that the turbulence set up within the solution insures constant replacement with fresh solution of the film of electrolyte over the cathode. See column 1, lines 34-41. As noted above, the arrangement of the liquid outlets in Norris move the solution in a circular pattern. Norris observes that the entire cathode was uniformly plated (column 7, lines 18-20). It would have been obvious to have utilized additional nozzles in Mori as shown by Norris because increased solution flow would have been obtained and the plating pattern would have been better controlled resulting in a more uniform deposit as taught by Norris.

Claims 1, 3-5, 18, 19, 20, 22, 23, 24, 27 29, 30 and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Eidschun (4,443,304).

Eidschun discloses a process for electroplating a metal such as copper onto substrates such as printed circuit boards from an electroplating solution containing the metal to be deposited. Each plating module is adapted for plating eight printed circuit boards with copper at one time (column 2, lines 53-57). The circuit boards are connected as a cathode to allow electroplating to take place (column 4, lines 9-14). Figure 4 can be considered a front view, and figure 5 can be considered as a view from the right. The electrolyte is injected through a plurality of nozzles 55. Eidschun teaches that nozzles can be angularly adjusted to impinge directly or at an acute angle on the printed circuit board substrates. See the abstract, lines 3-5 and column 1, lines 41-44. Figures 3, 4, 5 and 8 show the nozzles 55 in the apparatus used to perform the electroplating process. The nozzles are off-center from a central axis of the substrate when viewed from the front and at an angle other than normal to the surface of the substrate when viewed from the right. Thus, the nozzles are positioned in accordance with the limitations recited in instant claims 1 and 18. Since the nozzles are positioned in the same manner recited in the claims, the flow characteristics would be expected to be the same.

Claims 21 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eidschun.

Eidschun is taken as above. As previously noted, Eidschun teaches that the nozzles impinging directly of at an acute angle. This would have suggested to one of ordinary skill in the art any acute angle, including an angle of 20 to 60 degrees as recited in instant claims 21 and 28. Thus, it would have been obvious at the time the invention was made to have angled a nozzle at an angle of 20 to 60 degrees in the process of Eidschun because Eidschun broadly teaches the use of an acute angle.

(11) Response to Argument

Rejections under 35 U.S.C. 112, second paragraph

Appellant does not address the rejection of claim 33 under 35 U.S.C. 112, second paragraph.

Rejection under 35 U.S.C. 102(b) over Norris

Appellant argues that Norris does not include outlets that are at an angle other than normal to the surface of the substrate when view from the right. Merriam Webster's Collegiate Dictionary, tenth edition, defines "normal " as "perpendicular". Thus, to fall within the scope of appellant's claims, the outlets must be oriented in some direction other than perpendicular to the surface of the substrate. As explained in the grounds of rejection above, the nozzles of Norris are indeed at an angle other than normal (perpendicular) to the surface of the plate electrodes 108 and 110 which are the substrates being plated. At page 9, line 1 of

the brief, appellant observes that the outlets of Norris are parallel to the plate electrodes. This observation is consistent with the Examiner's interpretation of the Norris reference. If the nozzles are parallel to the plate electrodes, then they are clearly at an angle, in this case a right angle, other than normal to the surface of the plate electrodes.

Rejection under 35 U.S.C. 103 over Mori in view of Norris

At page 10 of the brief, appellant argues that neither Mori nor Norris teaches having an outlet that when viewed from the right is at an angle to the substrate surface as included in claims 1 and 18. This argument is not persuasive because, as explained above, Norris does teach a method of electroplating in which liquid is directed from an outlet which, when viewed from the front, is off-center from a central axis of the substrate normal to the surface, and, when viewed from the right, is at an angle other than normal to the surface so that the liquid flows rotationally over the surface about the central axis.

Rejection under 35 U.S.C. 102 over Eidschun

Appellant argues that "Eidschun does not disclose having an outlet other than normal to the surface so that the liquid flows rotationally over the surface about the central access [sic: axis]". This argument is not convincing. Instant

claims 1 and 18 recite a single "outlet which, when viewed from the front, is off-center from a central axis of the substrate normal to the surface, and, when viewed from the right, is at an angle other than normal to the surface". As explained in the statement of the rejection, Eidschun discloses an outlet nozzle positioned in accordance with the limitations recited in claims 1 and 18. Since an outlet of Eidschun is positioned in the same orientation with respect to the substrate as the outlet of appellant, the resulting flow would be expected to be the same.

The claims of an application are interpreted in light of the specification. In this application, it is important to refer to the specification for guidance as to the interpretation of the limitation "flows rotationally". It is first noted that the specification does not include the language "so that the liquid flows rotationally over the surface about the central axis" now recited in the claims.

The specification does describe a plurality of configurations of the liquid outlets and the resulting flow pattern. One example is the configuration shown in Fig. 1E which is described at page 5, line 22 to page 6, line 4. As shown in figure 1E, outlet 100 is positioned at an angle of about 45° from vertical. The specification explains that "Liquid flow 70 emanating from elbow joint 125, 120 in either Figs. 1D or 1E is directed radially outwardly from nozzle 60, so that liquid contacts cylindrical walls 30 of the enclosure 20 (Fig. 1A). When in contact with cylindrical walls 30, liquid flow 70 rotates according to the shape of cylindrical walls 30." In

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this embodiment, outlet 100 lies in the plane of the paper. (In the next embodiment shown in Fig. 1F, the outlet is at an angle with respect to the plane of the paper).

Since the nozzle lies in the plane of the paper, when the liquid leaving the nozzle low strikes the wall 30, an equal amount will flow counterclockwise (into the paper) and clockwise (out from the plane of the paper) when viewed from above.

Consequently, there will be no net flow of the bulk plating solution around the central axis of the enclosure, i.e. no circular rotation about the central axis when viewed from above. Thus, when the specification states that the liquid flow 70 "rotates", the term "rotates" is necessarily describing some other type of rotation, such as localized swirling. Since, as shown in Fig. 1C there are outlets surrounding the central axis, there will be localized swirling or rotation about the central axis. In the same way, the plurality nozzles of Eidschun, which are positioned on all sides of the central axis of the circuit boards, will produce localized swirling or rotation about the central axis.

Rejection under 35 U.S.C. 103 over Eidschun

Appellant argues that claims 21 and 28 are dependent on either independent claims 1 or 18 and are patentable for the same reasons as claims 1 and 18. As explained above, Eidschun discloses a method in which a plurality of liquid outlets are provided which are at an angle other than normal to the surface being plated,

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and which cause liquid to flow rotationally about the central axis of the substrate, thereby teaching the limitations of claims 1 and 18.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

ROY KING

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March 18, 2002

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